

AdvLinux for i486SX

User Manual

V1.02

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1. About This Manual

Thank you for using Advantech product. This manual is a very detailed account of AdvLinux-i486SX. This document may be copied and distributed in any medium, either commercially or non-commercially, provided that the GNU Free Documentation License (FDL), the copyright notices, and the license notice saying the GNU FDL applies to the document are reproduced in all copies, and that you add no other conditions whatsoever to those of the GNU FDL.

2. AdvLinux for i486SX Overview

Advantech Embedded Linux for i486SX is an embedded Linux developed for Advantech UNO with i486SX CPU with 2.6.26 kernel. The system is a migration production from Debian 5.03. The text mode, graph mode or development mode can be chosen to install. Its major functions include: all system-required shell commands, ftp server, telnet, dhcp client, graph operation based on X-window and development environment. User can develop the user mode application with Debian 5 and transplant the developing results to UNO. To develop the kernel mode module, user can only compile it in UNO.

2.1. Support devices

UNO-1140, UNO-1140F

2.2. Main Features

Here we list some important new feature in AdvLinux-i486SX and gave a brief introduction.

- Support i486SX CPU.
AdvLinux-i486SX supports the EVA i486SX CPU without FPU.
- Provide development environment
Although the AdvLinux-i486SX is a embedded Linux, but it support basic development if user can choose to install the development environment
- lightweight desktop environment
The desktop environment of AdvLinux-i486SX is not the gnome or KED, it user a lightweight desktop named fluxbox, it will boot up the Linux quickly and need less resource.

- Less resource requirement and faster boot up.
Because AdvLinux-i486SX is designed mainly for UNO with EVA i486SX CPU, we start to development it after careful consideration, so it will need less resource.
- Auto login
Installation provide an auto login option, if user choose it, after installation, User can auto login the AdvLinux-i486SX without password. Of course, user also can modify the AdvLinux-i486SX configuration file to auto login or not after installation.

3. Install Advantech Embedded Linux for i486SX

3.1. System Requirements

Before the installation, the user should make sure that the system is ready to meet the requirements of installation. Extra attention should be given to the following items:

(1) If other operating system have already been installed in computer and the user should determine whether Advantech Embedded Linux for i486SX can remains in the computer together with other operating systems previously installed. The user should know the system partition of the previous system.

(2) The number and size of storage medium. The user should make sure that there is sufficient space for Advantech Embedded Linux for i486SX.

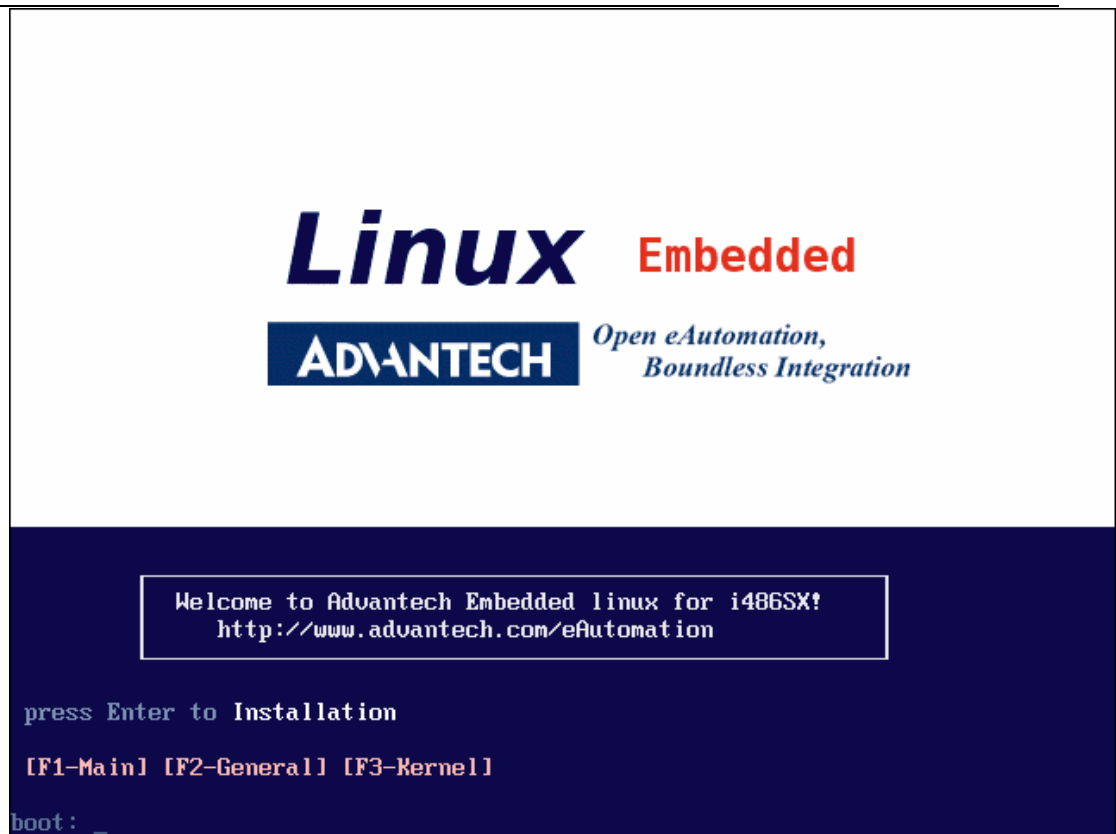
3.2. Prepare for installation

We suggest that the user make a copy of data in storage medium in order to prevent data damage in case of improper operation during installation.

Advantech Embedded Linux for i486SX is released with one disk only.

(1) Connect to an external USB CD driver in the UNO, boot the machine from the CDROM . Insert the disk of Advantech Embedded Linux for i486SX into the CD driver, sets the BIOS to boot from CDROM and reboot the computer.

(2) Start installation:

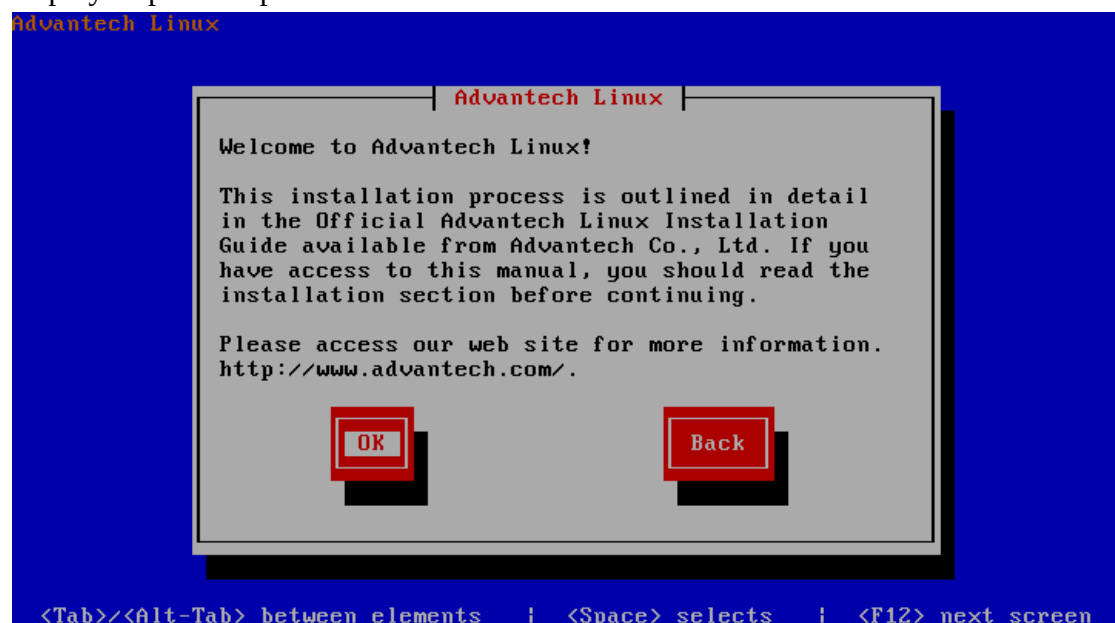


Picture 1.1 Select the installation mode

When the computer has been booted from the disk successfully, the above picture will be shown.

3.3. Installation Progress

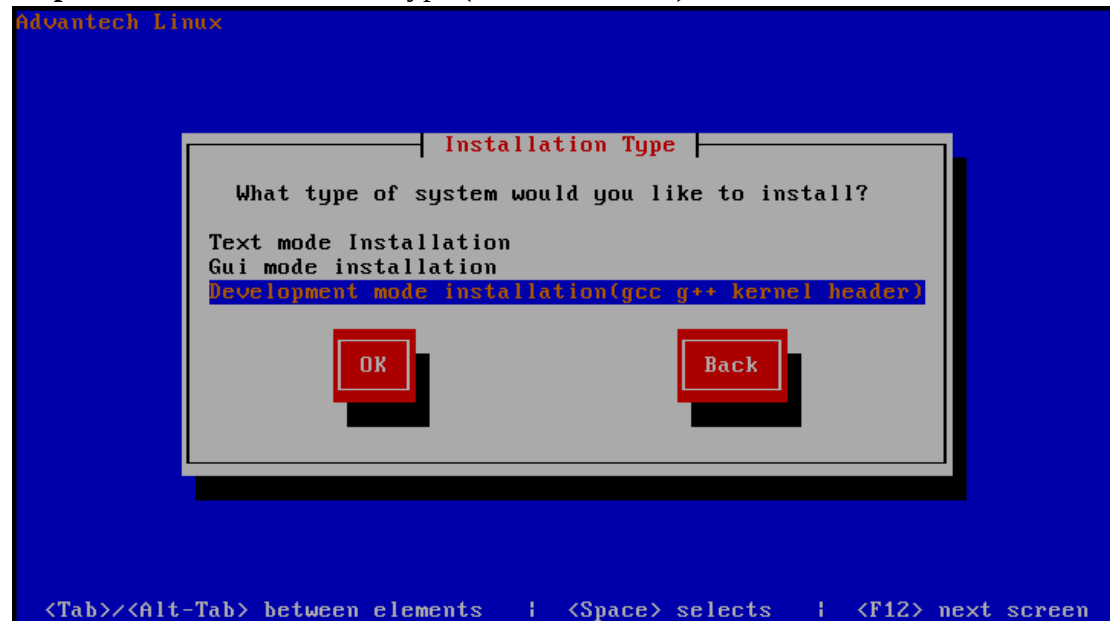
Step 1: the following interface will be shown. Then please follow the introductions step by step to complete the installation.



Picture 1.2 Welcome picture

Press <OK> to continue the installation.

Step 2: Select the installation type (as shown below).



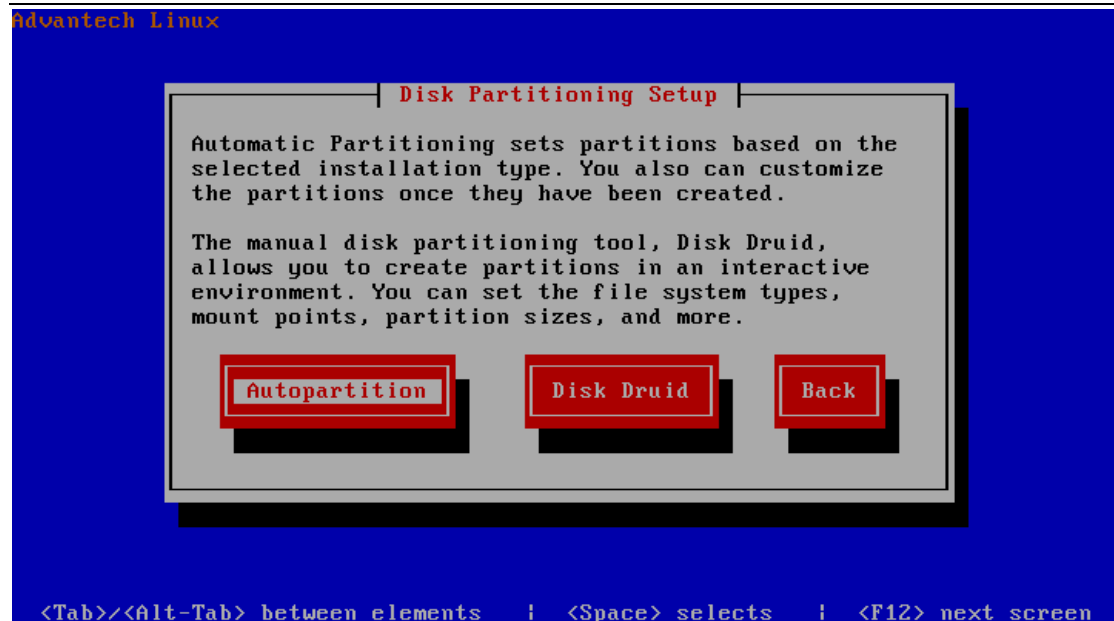
Picture 1.3 Installation mode select interface

There are three installation types:

1. Text mode installation mode: Includes elementary and necessary components.
The minimum disk space required: 256M.
2. GUI mode installation mode: Includes X windows with fluxbox windows manger.
The minimum disk space required: 512M.
3. Development mode installation: Includes X windows and basic development tools like gcc,g++ and kernel header.
The minimum disk space required: 512M.

After the installation type is selected, press <OK> to continue the installation.

Step 3: Disk partition (as shown below).



Picture 1.4 Disk partitioning type selection interface

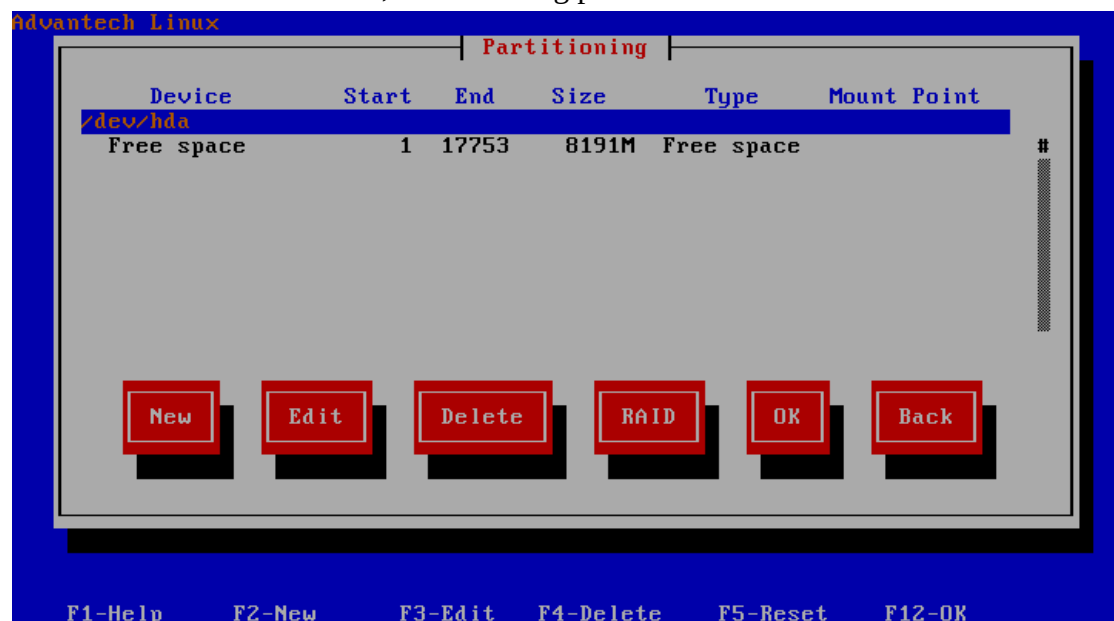
There are two types of disk partition:

Auto Partition: automatically partitioning

Convenient, but the default operation is to delete all the previously divided Linux partitions of the disk and thus data is lost.

Disk Druid: manually partitioning

If Disk Druid is selected, the following picture will be shown:



Picture 1.5 Manually partitioning interface

Manual partitioning is convenient that the user can edit, build and delete partitions as well as specify the size of partitions, the format of file system and the mount point.

Build a new partition: To install a system on a new partition, press the “New” button on the main window to build a new partition. The installation procedure will pop up a dialog box for the user to specify partition parameters. Advantech Embedded Linux for i486SX use ext2 file system format by default.

Note: For more excellent performance, build a swap partition if the disk space is sufficient. The space of this partition should be the same with memory or better twice the memory space. The user will be alarmed if the swap partition is not created. If auto partition is selected, the default function will not build a swap partition.

Delete a partition: Press “Delete” button on the main window to delete partitions. If a partition is deleted mistakenly, press “Reset” button to recover.

Edit a partition: Edit the current partition parameters.

Select the partition to install the system and press <OK> to continue the installation.

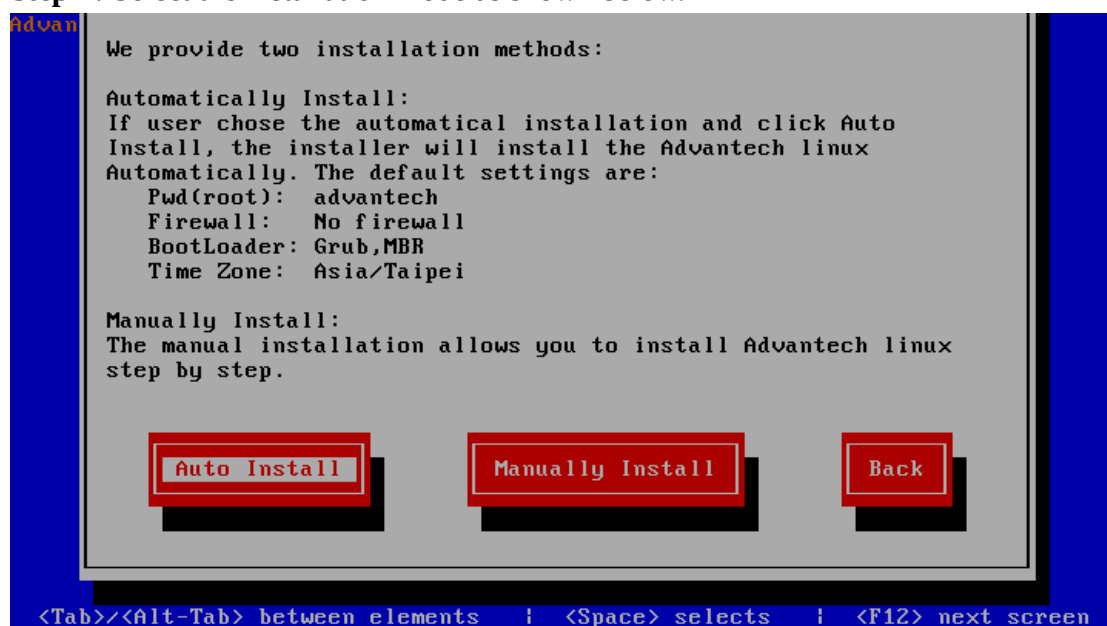
The Partitioning Warnings window will pop up as shown below.



Picture 1.6 Partitioning Warning

This warning is a routine when you have not specified a swap partition. If the user makes sure the partitioning is right, press “Yes” button to continue the installation.

Step 4: Select the installation mode as shown below.



Picture 1.7 Installation mode selection interface

Two kinds of installation mode:

Automatic installation: Use the default settings during the installation without user participation. The default settings are:

Root password: advantech.

Firewall: Disable.

Boot Loader: The boot procedure grub will be installed in the Main Boot Record (MBR).

Time zone: Asia/Taipei

Network configuration: Obtain the IP address by DHCP.

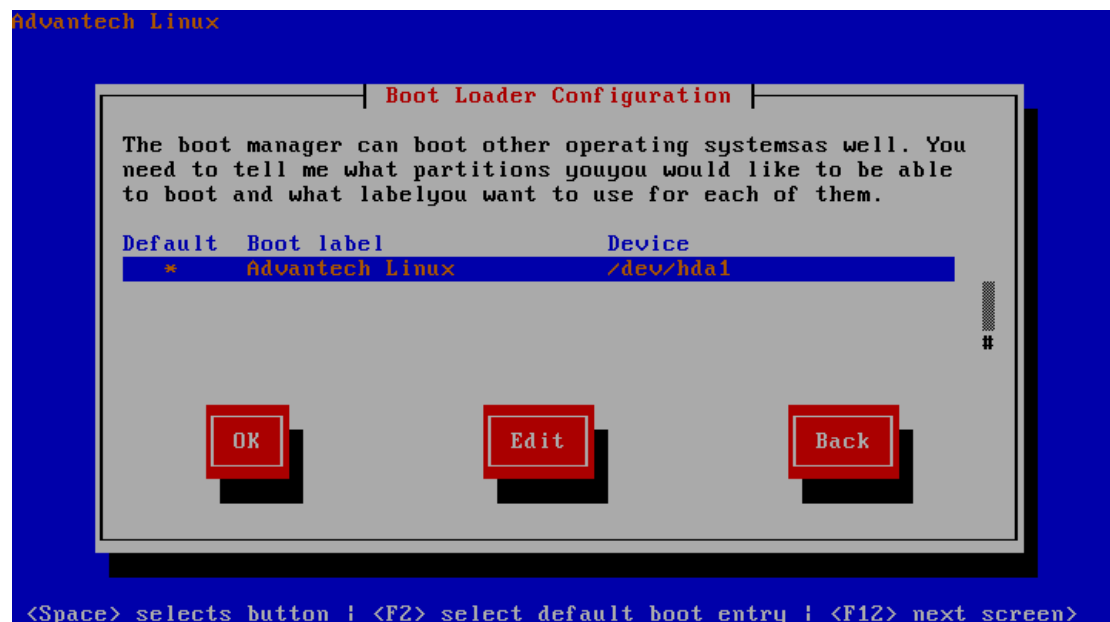
Press <Auto Install> to begin the installation automatically.

Manually installation: The users can specify their own settings during the installation.

The following is the process of manual installation:

(1) Install the GRUB boot loader:

The Boot loader installation interface is shown as below:

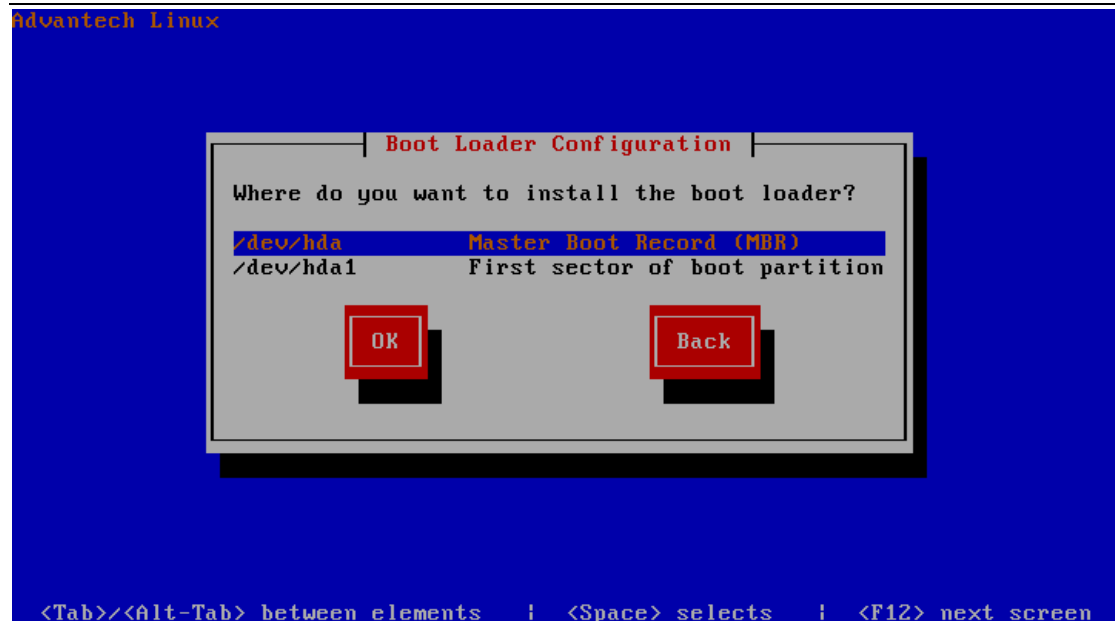


Picture 1.8 Boot loader installation interface

Press <OK> to continue.

The boot loader will be installed in MBR by default. If an operating system is previously installed on the same disk, then the new boot loader will cover the previous data in MBR and the new MBR does not include the previous operation systems thus they cannot be booted normally.

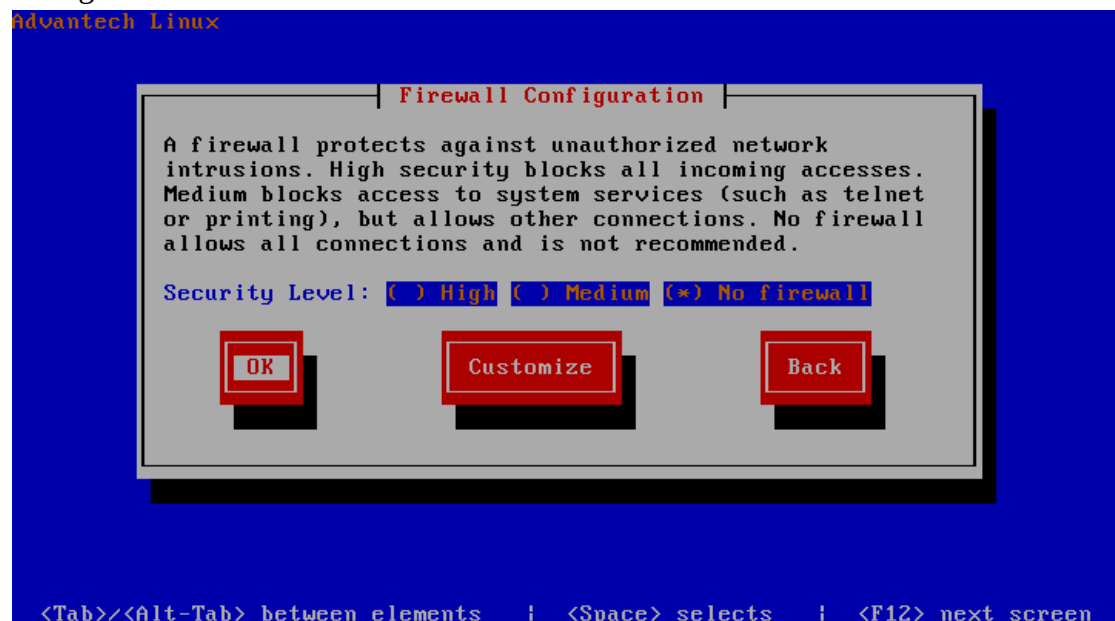
So if another operating system is previously installed on the disk, we recommend the user to tick the check box and install the boot loader in the first boot sector of the system partition.



Picture 1.9 Install the GRUB boot loader

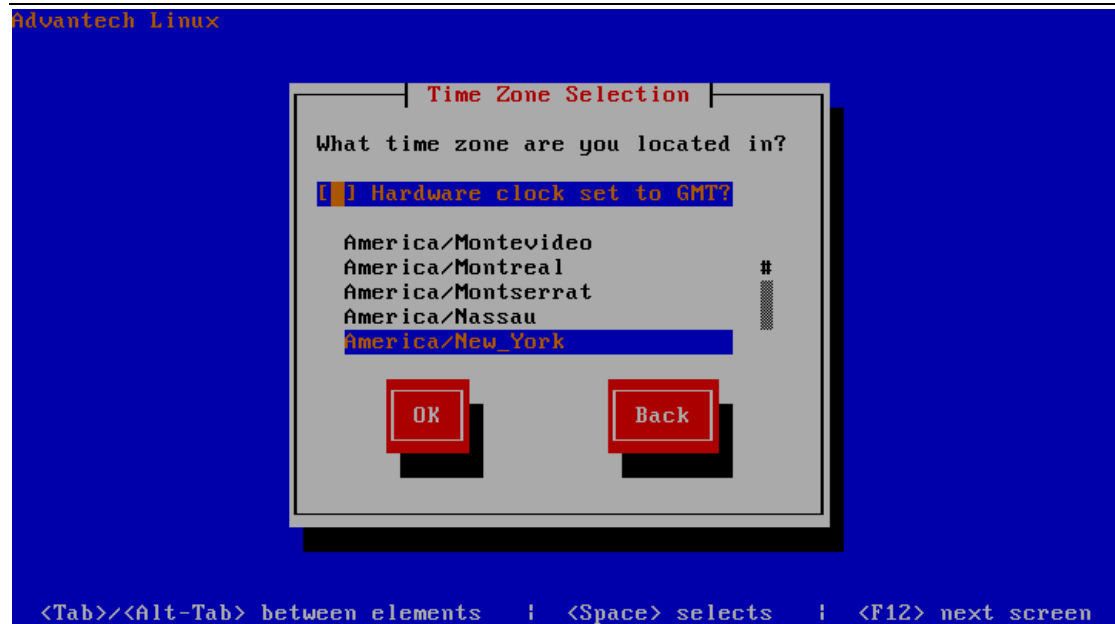
After affirmation, click <Next> to continue the installation.

Step 5: The firewall is disenabled by default; the user can chose “High” and “Medium” to enable the firewall while the system is installed. The firewall configuration interface is shown as below:



Press <OK> to continue the installation.

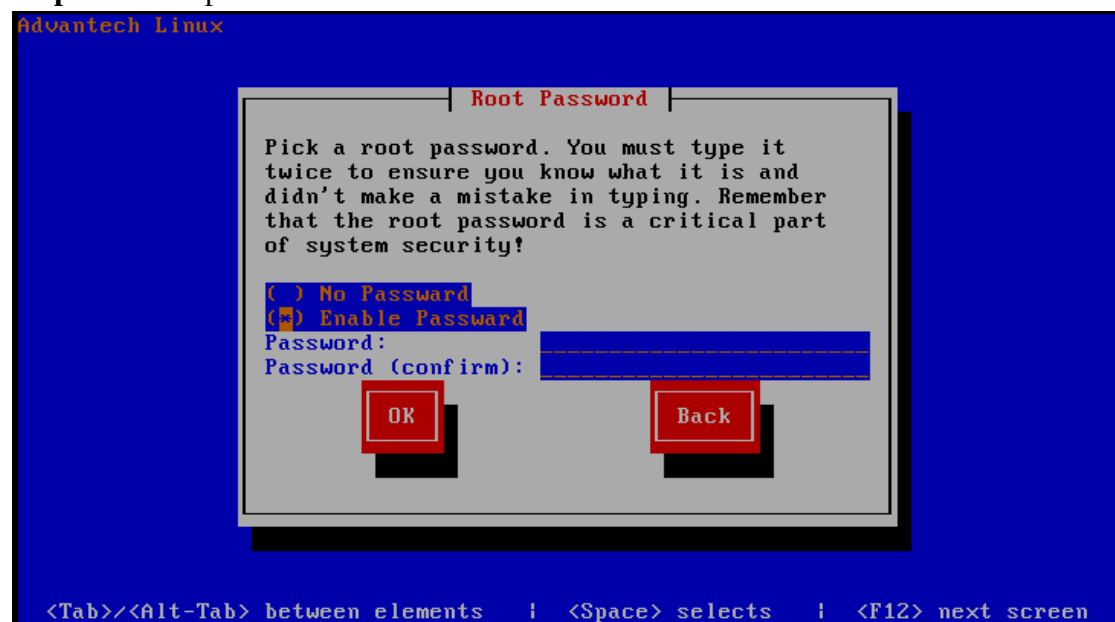
Step 6: time zone configuration.



Picture 1.10 Time Zone configuration

The user can select the time zone in the list. Select “Hardware clock set to GMT” to configure the system clock to use GMT (Greenwich Mean Time).

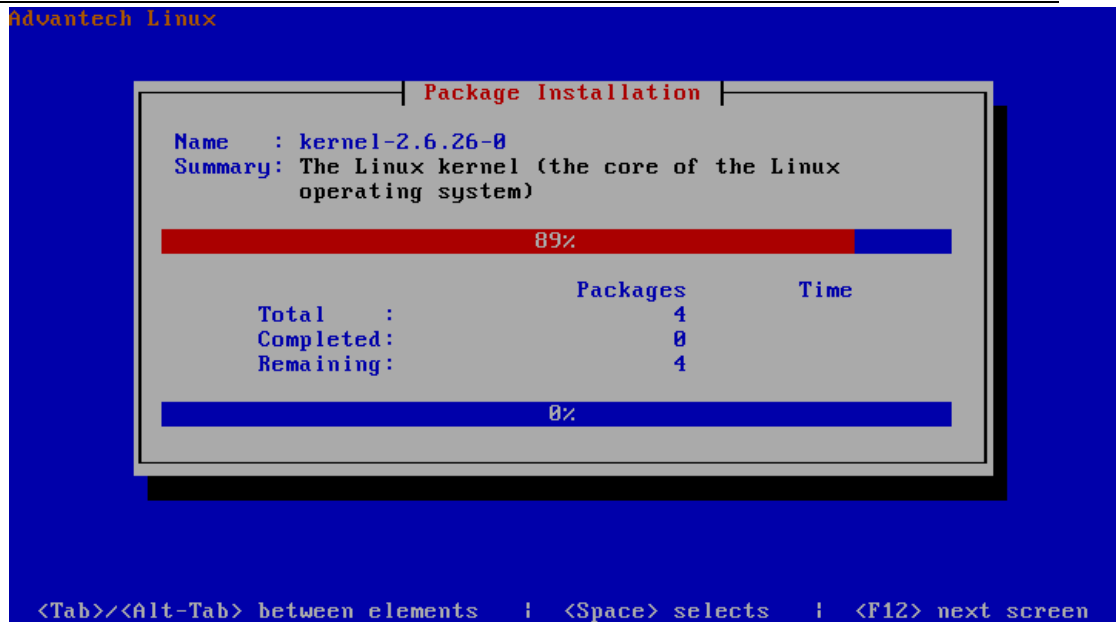
Step 7: set the password of root user.



Picture 1.11 Set Root Password

Users could choose whether to set the password of root user. if “No Password” is selected, users can autologin to system without a password.

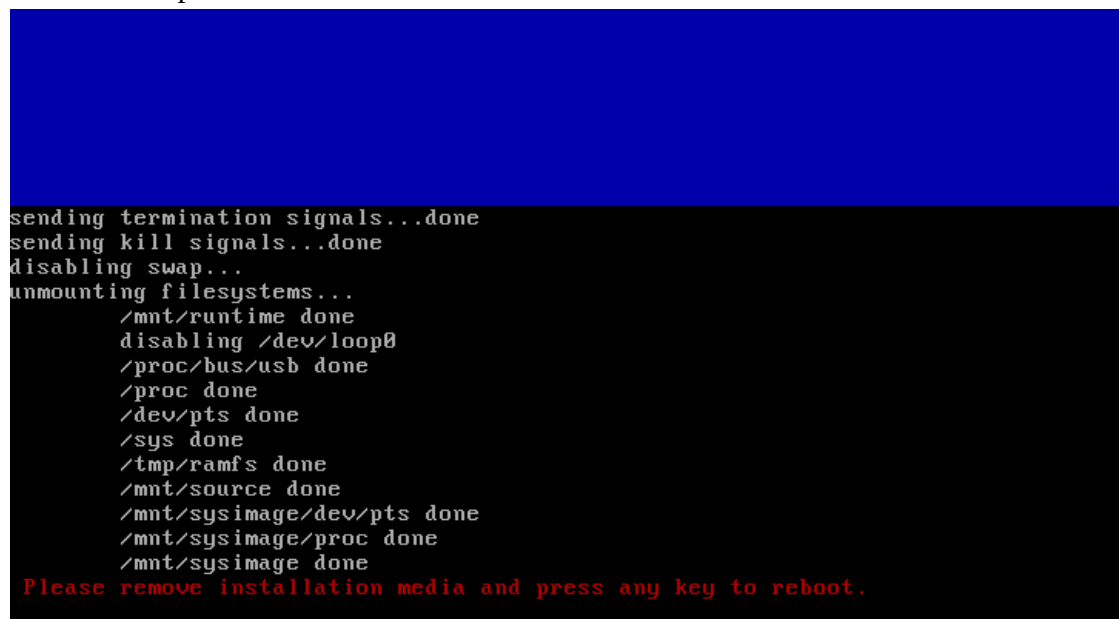
After the selection, click <OK> to begin system installation..



Picture 1.12 Installation process interface

The time required by the installation process is relative to hardware performance. It can be several minutes.

The installation completion interface is shown below.



Picture 1.13 Installation Completion Interface

After the installation, Press any key, then the CD driver will eject, please move the disc from the CD driver and press any key to restart the system.

The system installation is complete, please enjoy it!

4. Configure the system

After the installation, the user can configure the system by demands for better performance.

4.1. System network service configuration

The following table shows the default status of network service after the system service is initiated.

Service	Status
ftp	enable
telnet	enable

4.2. Start the system service

4.2.1. Ftp service

Perform the following command at the terminal (shell command line) to initiate the ftp server:

```
#/etc/init.d/vsftpd start
```

If “OK” is echoed at the terminal, then the ftp service has been initiated.

NOTE: the users should edit vsftpd configuration file (in /etc/vsftpd.conf) according to your requirement.

4.2.2. Telnet service

To initiate the telnet service, edit the file accessed by /etc/inetd.conf. Uncomment the line with telnet and save the change. Perform the following command to initiate the telnet service.

```
# /etc/init.d/openbsd-inetd restart
```

Afterward, access this host through the telnet command of another one. If the testing page is shown normally, then the telnet service of this host has been normally initiated.

4.3. Network configuration

4.3.1. Use the static IP address

For example, if configure eth0 to use the IP address 172.21.73.30, then edit the file accessed by /etc/network/interface as shown below:

```
auto eth0
iface eth0 inet static
```

```
address 192.168.1.10
netmask 255.255.255.0
network 192.168.1.0
broadcast 192.168.1.255
gateway 192.168.1.1
```

After the file is edited and saved, use `ifup eth0` again to enable the network card.

If the static IP is already used, then perform the following command to change the IP address:

```
#ifconfig eth0 ***.***.***.*** (new IP address)
```

4.3.2. Acquire the IP address dynamically

To acquire the IP address dynamically, edit the file accessed by `/etc/network/interface` as shown below:

```
auto eth0
iface eth0 inet dhcp
```

After the file is edited and saved, use `ifup eth0` again to enable the network card.

5. System safety and optimization

5.1. Responsibility of system safety management

The system safety is greatly relative to the manager. The manager's responsibility includes four aspects:

- (1) Prevent unauthorized access: This is the most important issue about the safety. To avoid unauthorized access, the key steps include password management, record and report about logging in activities, periodical check for user network activities.
- (2) Anti-telling: Avoid the authorized and unauthorized user's access important information of each other. The measures for anti-telling include encrypting, file system check, su logging in and report.
- (3) The system manager can examine the system periodically by ps, df and du commands, deal with the processes and files that overuse the system resource.
- (4) Keep the system integrality. Periodically backup the file system, Perform the fsck command to check system breakdown, restore the file system, etc.

5.2. Password

The update realizes the function of auto login. If users select "manually install" during the installation, the installation program will ask them to select whether to set the password of root user. If users choose not to set the root user's password, the system will automatically login as root user for each boot after system installation. The following are rules for selecting effective and safe passwords.

- (1) The password should best be composed by 6 characters with at least one number or special character.
- (2) The password must not be the name, telephone number or other personal information.
- (3) The password must be used for a period of validity only. It should be changed after a period of time.

After the Linux is installed, the minimum number of password character is 5 by default or compulsively set to greater than 5. For example, if the number of character is 8, edit the file accessed by /etc/login.defs. Find out the line PASS_MIN_LEN 5 and change 8 to 5. Other safety measures can also be set in this file, such as the period of validity for the password.

There is no restricting for the root account. Special attention should be given to the root account usage. Especially do not use the root account

to log in the server on another computer.

5.3. Prevent the system from responding to the ping command

This is a good way to protect the system. To prevent the system from responding to the ping command, the following command can be used:

```
#echo 1 > /proc/sys/net/ipv4/icmp_echo_ignore_all
```

To restore the system to respond the ping command, use the following command:

```
#echo 0 > /proc/sys/net/ipv4/icmp_echo_ignore_all
```

5.4. Prohibit the keyboard closing command Control-Alt-Delete

Annotate the following line in the file accessed by `/etc/inittab`:

```
ca::ctrlaltdel:/sbin/shutdown -t3 -r now
```

Then change it to:

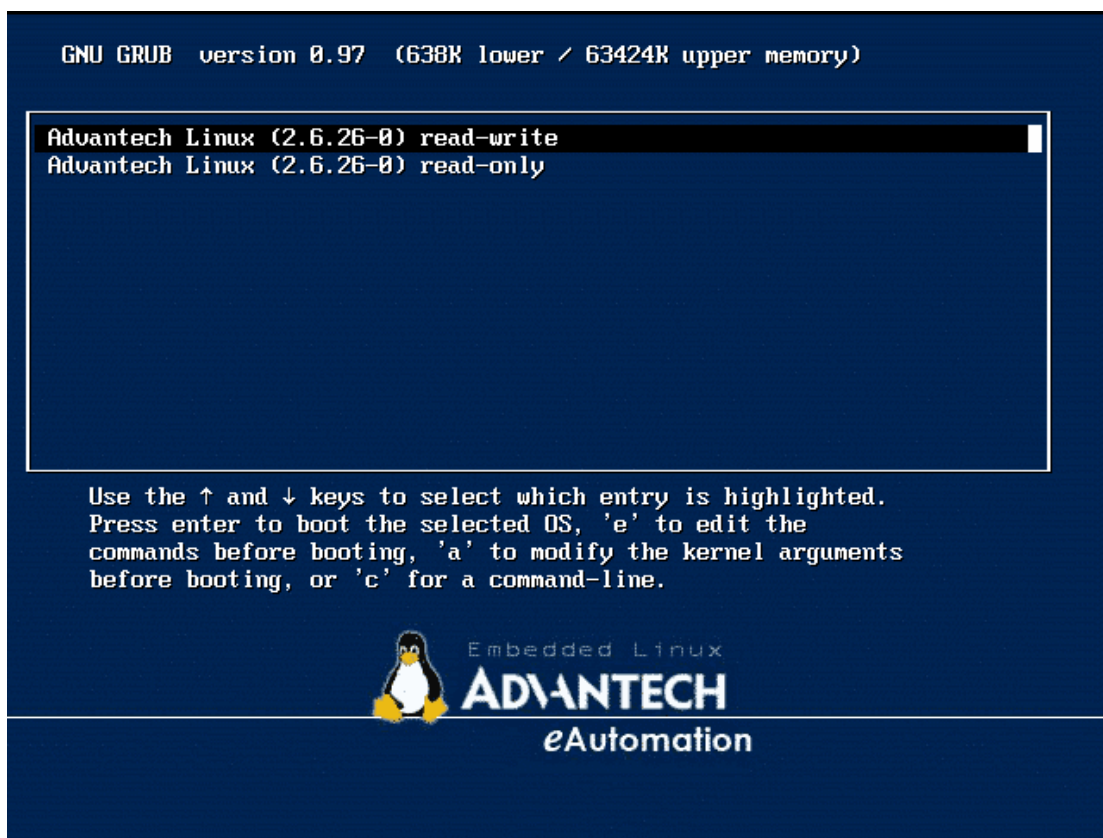
```
#ca::ctrlaltdel:/sbin/shutdown -t3 -r now
```

Enter the following command in order to perform the change:

```
# /sbin/init q
```

5.5. Make the root file system read-only

Advantech Embedded Linux for i486SX can mount root file system with read-only or read-write mode according to parameter in grub configuration file. When grub is loading during system is booting, press the direction key and an interface providing two boot choices for the user to select. The writable mode is set as the default. In order to enhance its stability, the user had better to select the read-only mode.



Picture 3.1 Boot up mode select

The read-write mode is the default startup option. In order to change the default startup option to the read-only mode, follow the command below:

```
vim /boot/grub/menu.lst
```

Then change “default=0” to “default=1”.

6. X-Windows Introduction

Advantech Embedded Linux for i486SX can be used in graphical environment. If the user chooses graphical mode installation when installing the system, then the system will start up X-window by default.

6.1. X-window system components

1) Xorg

It is a cost-free standard X server software with high configurability. All graphic cards on the market have certain configuration for Xorg. Xorg-X11 is a branch of XFree86 and bases on standard X11 protocol. For further details, refer to <http://www.x.org/>

2) Fluxbox

Fluxbox window manager: FluxBox is another X window manager based on and looks like Blackbox 0.61.1. It is used to specify the form, color and window.

The system uses the version fluxbox-1.0.0.

Official website: <http://www.fluxbox.org/>

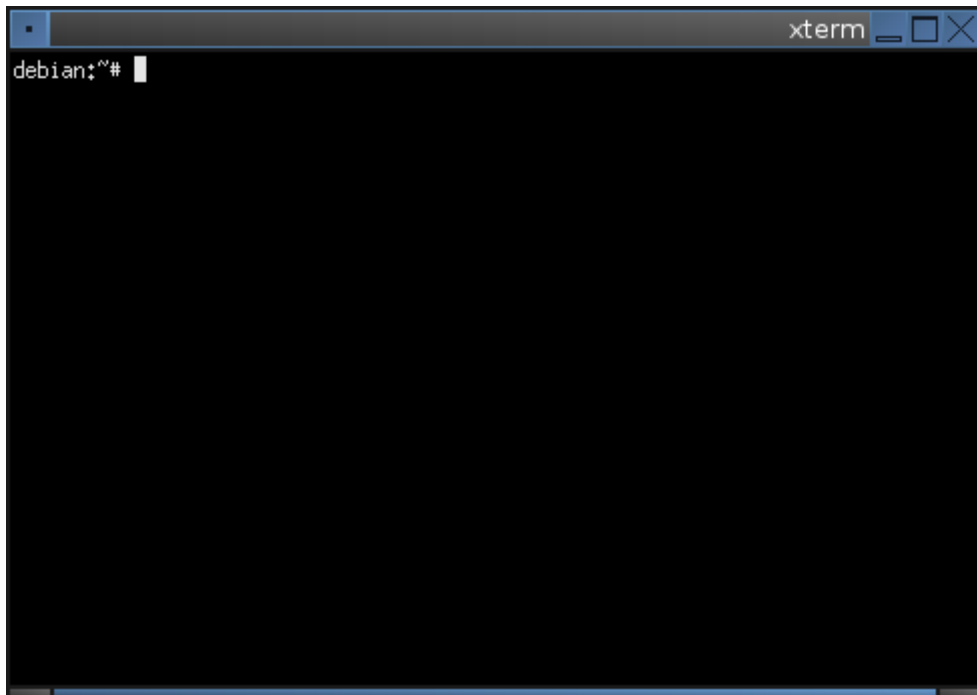
3) Xdm

It is an X client program and is mainly used for building a login to check the password and configure the environment after login.

4) Other X applications:

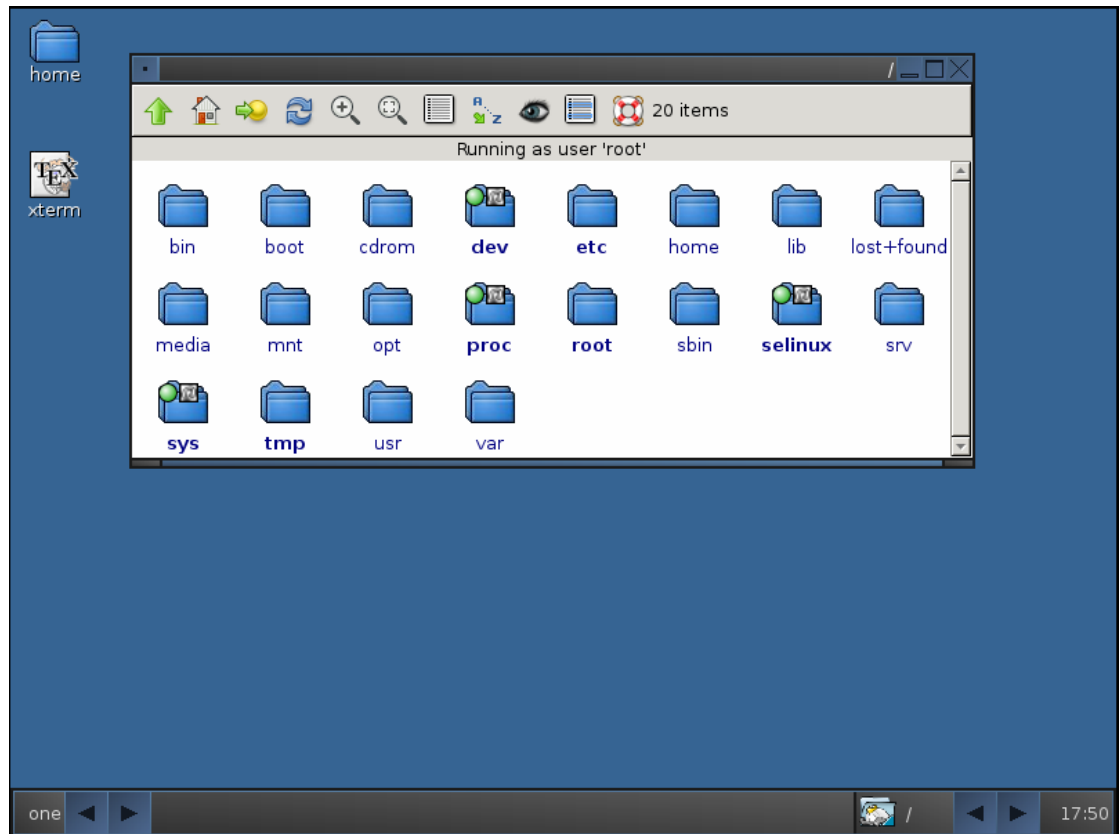
- Xterm:

The terminal in X environment.



- Rox-filer:

It provides folder management functions similar to windows and can be used to configure desktop icons. It follows the GPL.



The system uses the version rox-2.7.1.

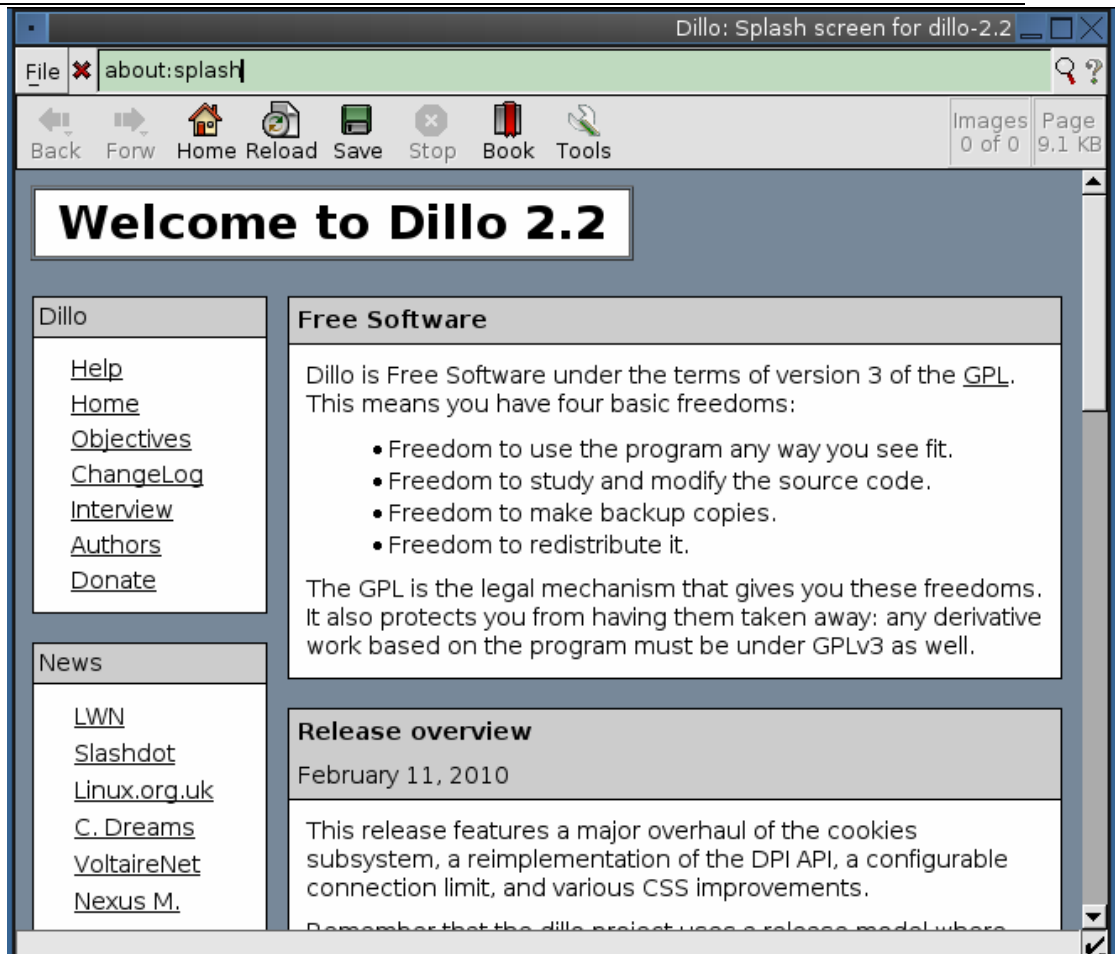
Official site: <http://roscidus.com/desktop/>

- Dillo:

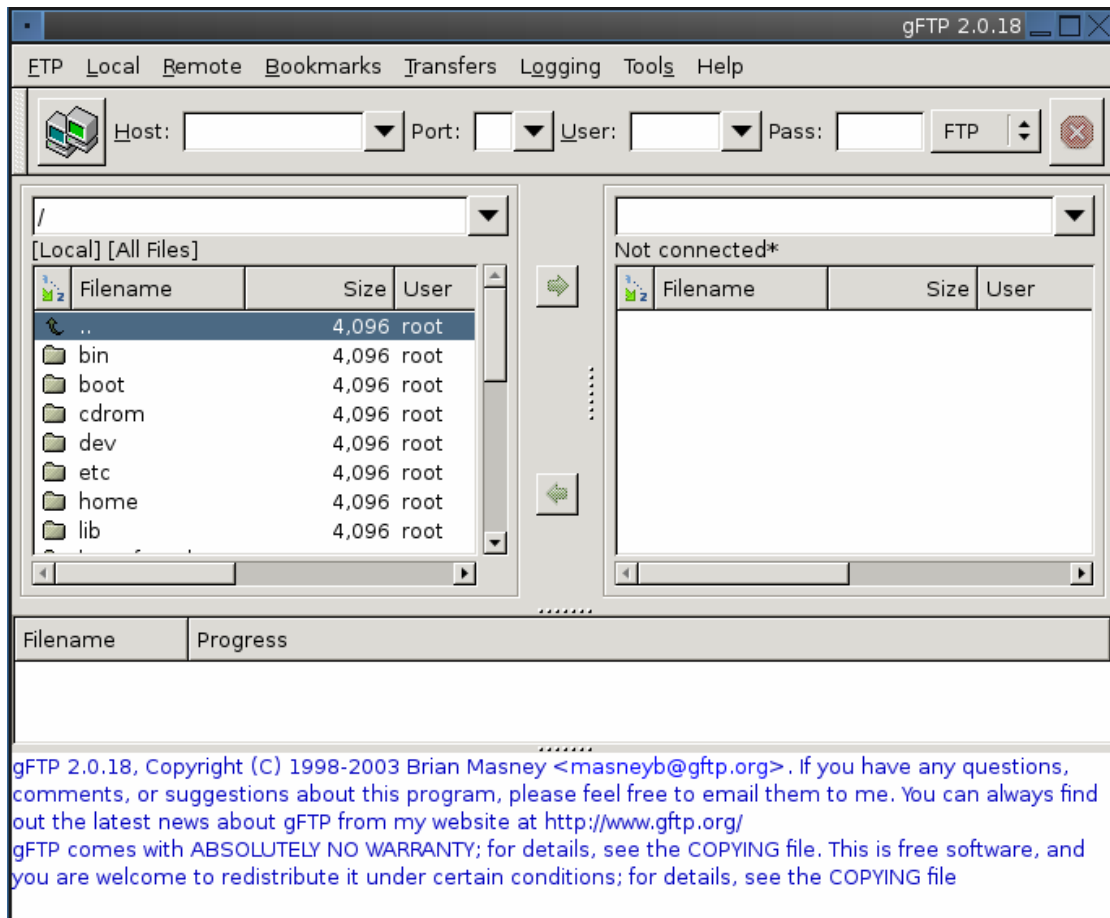
A mini browser that follows the GPL. Completely written with the C language, its speed is fast. It is a graphical browser based on GTK+ and can be used for browsing net pages and downloading files.

The system uses the version dllo-2.2

Official website: <http://www.dillo.org/>

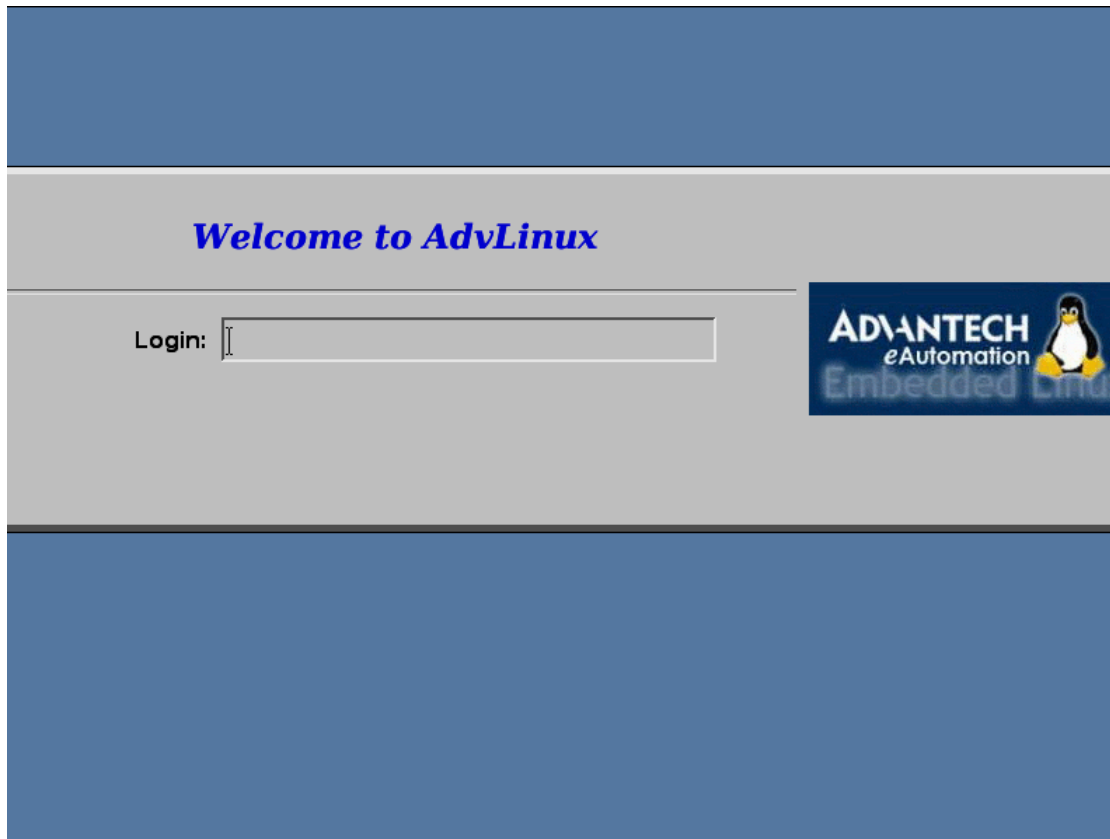


- Gftp:
A mini ftp server. Follow the GPL.
The system uses the version gftp-2.0.18.

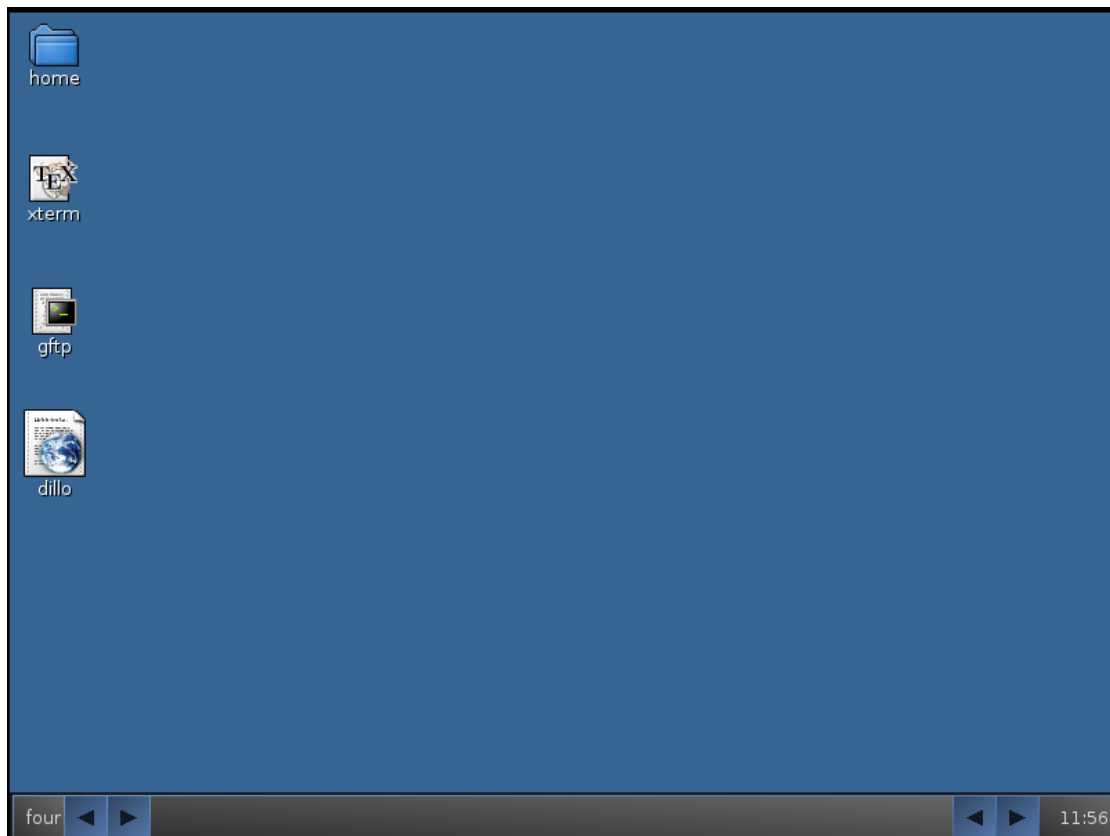


6.2. Startup process

(1) Login screen. The user is demanded to enter the username and password.



(2) Desktop environment.



7. Development for Advantech Embedded Linux

AdvLinux-i486SX provide basis develop tool and library such as gcc and g++, if user install development system. User can develop console mode application or kernel driver in AdvLinux-i486SX. If user want to develop Xwindow application, it need Xwindow library and Xwindow development header files, all of them can be online installed by apt-get command, but we suggest user to develop GUI application on host computer with Debian 5 and then copy the GUI application and runtime library to the AdvLinux-i486SX device.

Here is some suggestion you may can reference when development.

- To develop gtk+ based application, please refer to <http://www.gtk.org/> for more information
- To develop advantech driver based application, please refer example in /usr/src/advantech
- To develop java base application, please refer to <http://www.sun.com>